

CLAIMS

1. A retroreflective sheet, comprising:
 - plural retroreflective elements;
 - 5 a resin support sheet;
 - a transparent cover film disposed on a surface side of the resin support sheet; and
 - a pressure-sensitive adhesive layer formed on a rear face side of the resin support sheet,
 - 10 wherein the retroreflective element is held in at least one of the resin support sheet and the cover film,
 - the resin support sheet and the cover film are connected to each other by heat press emboss forming from the rear face side of the resin support sheet so as to form a connection part,
 - 15 a groove of the connection part is formed on the rear face side of the resin support sheet,
 - the groove is filled with a part of the pressure-sensitive adhesive layer,
 - a residual rate of the pressure-sensitive adhesive layer ranges
 - 20 between 10% and 50% inclusive, and
 - a fall time of the pressure-sensitive adhesive layer ranges between 10 hours and 150 hours inclusive: where
 - the residual rate (%) = (a residual displacement ÷ an initial displacement) × 100,
 - 25 the initial displacement represents a displacement (mm) between a flat plate and the retroreflective sheet measured by a Yamamoto's cohesion tester, which occurs after 5 minutes from steps of: pressing the retroreflective sheet with a size of 10 mm × 5 mm onto the mirror-surfaced flat plate of a SUS304 steel plate specified by JISG 4305 with a width of 5
 - 30 mm, using a pressing device specified by JIS Z 0237; adding loads of 17 g respectively to both ends of the retroreflective sheet via strings immediately after the pressing; and further applying a measurement load of 200 g to one of the loads,
 - the residual displacement represents a displacement occurring
 - 35 between the flat plate and the retroreflective sheet after 10 minutes from removal of the load of 200 g, and
 - the fall time represents a fall time of the retroreflective sheet with a

load of 9.8 N imposed in a holding power test at 40°C in accordance with a JISZ0237 holding power test.

2. The retroreflective sheet according to claim 1, wherein a filling factor of the pressure-sensitive adhesive layer in the groove is 50% or more:

5 where

the filling factor (%) = $[(A - B) \div A] \times 100$, wherein

the letter A denotes an area of the groove per unit area of the retroreflective sheet, and

10 the letter B denotes an area of an opening gap formed on an interface between the groove and the pressure-sensitive adhesive layer per unit area of the retroreflective sheet.

3. The retroreflective sheet according to claim 1, wherein the residual rate ranges between 15% and 45% inclusive.

15 4. The retroreflective sheet according to claim 1, wherein the fall time ranges between 20 hours and 140 hours inclusive.

5. The retroreflective sheet according to claim 1, wherein a thickness of the pressure-sensitive adhesive layer at a part where the groove is not formed on the rear face side of the resin support sheet ranges between 20 μm and 110 μm inclusive.

20 6. The retroreflective sheet according to claim 1, wherein the pressure-sensitive adhesive layer is formed of a rubber-based resin or an acrylic resin.

7. The retroreflective sheet according to claim 1, wherein the retroreflective element is a transparent bead of which a hemisphere part is covered with a reflective mirror, and is supported so that the hemisphere part of the transparent bead covered with the reflective mirror may be embedded in the resin support sheet.

25 8. A retroreflective sheet laminate, comprising the retroreflective sheet according to claim 1 and a resin release film, wherein the resin release film is laminated on the pressure-sensitive adhesive layer.

9. The retroreflective sheet laminate according to claim 8, wherein the resin release film is a flexible resin film with Young's modulus ranging between 50 MPa and 2000 MPa inclusive.

35 10. The retroreflective sheet laminate according to claim 9, wherein the flexible resin film is an unstretched polypropylene film or a low-density polyethylene film.

11. A method for manufacturing a laminate of a heat-resistant release

material and the retroreflective sheet according to claim 1, comprising steps of:

preparing an original sheet of a retroreflective sheet comprising plural retroreflective elements,
5 a resin support sheet, and
a transparent cover film disposed on a surface side of the resin support sheet,

wherein the retroreflective element is held in at least one of the resin support sheet and the cover film,

10 the resin support sheet and the cover film are connected to each other by heat press emboss forming from a rear face of the resin support sheet so as to form a connection part, and

a groove of the connection part is formed on the rear face side of the resin support sheet;

15 forming a pressure-sensitive adhesive layer on the heat-resistant release material;

and filling the groove of the resin support sheet with a part of the pressure-sensitive adhesive layer, by disposing the heat-resistant release material with the pressure-sensitive adhesive layer formed thereon on the
20 rear face side of the original sheet of the retroreflective sheet, and adhering by inter-roll line pressure ranging between 100 N/cm and 800 N/cm inclusive at a roll surface temperature ranging between 50°C and 90°C inclusive from a heat-resistant release material side.

12. The manufacturing method according to claim 11, comprising a
25 further step of performing aging treatment to the pressure-sensitive adhesive layer at $23 \pm 2^\circ\text{C}$ and a relative humidity of $65 \pm 5\%$ for 7 days.

13. The manufacturing method according to claim 11, wherein the heat-resistant release material is one selected from the group consisting of:
30 a paper with a thickness ranging between 20 μm and 200 μm inclusive, a synthetic resin laminated paper with a thickness ranging between 30 μm and 220 μm inclusive, a polypropylene film that has a thickness ranging between 15 μm and 250 μm inclusive, and a polyester film that has a thickness ranging between 15 μm and 250 μm inclusive.

14. A method for manufacturing the retroreflective sheet laminate
35 according to claim 8, comprising further steps of:

peeling off the heat-resistant release material from a laminate of the heat-resistant release material manufactured by the method according

to claim 11 and the retroreflective sheet according to claim 1; and
adhering a resin release film there.

15. The method according to claim 14 for manufacturing the
retroreflective sheet laminate, comprising a further step of performing aging
5 treatment to the pressure-sensitive adhesive layer at $23 \pm 2^{\circ}\text{C}$ and a
relative humidity of $65 \pm 5\%$ for 7 days.